Synopsis

for

Ph. D. research work

“Comparative Study of algal flora of Simaria and Nandan Pahar pond of Deoghar District with special reference to its physico-chemical properties.”

Submitted

by

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State of the Art

Pollution is the unfavourable alteration of our surroundings. It is wholly or largely as a by-product of man's actions, through direct or indirect effect of changes in energy patterns, radiation levels, chemical and physical constitution and abundances of organisms. Water pollution affects much and more to living organisms. There is great role of algae as indicator of water pollution. Algae are a group of simple autotrophic oxygen evolving aquatic organisms without any differentiations into true root, stem or leaf like organs. The water of both the ponds indicates its polluted natures which require proper scientific and ecological management.

Deoghar is one of the important religious town of Jharkhand, where large number of pilgrims visit for worshiping Lord Shiva. Deoghar is also known as a city of ponds. Here large numbers of natural and man-made perennial ponds are used for irrigation and fishing purpose. These ponds play great role to enrich the economy of the residents of Deoghar.

Simaria pond is a pond of religious importance. Pilgrims take holy dip in Chhat Vrata for worshiping. This is perennial pond created by Indian Railway. It is highly polluted pond and source of pollution of this pond is idol immersion, washing and bathing, domestic wastes and industrial effluents discharge. Sufficient care has not been taken to keep the water of this pond pollution free. This results in numerous diseases to the people taking bath/ holy dip. On initial examination of water samples from this pond has shown that it contains numerous pollutants viz. Cynophycean algae, phytoplankton, zoo plankton, chemical effluents, grease, oil etc.

Another pond situated at the base of Nandan pahar is main pond supplying potable water to people of Deogher town. Nandan Pahar is the symbol of struggle between mighty King Ravan and Nandi Bull of Lord Shiva. In this struggle Ravan was attacked and defeated by Nandi Bull. At the bottom of Nandan Pahar there is a pond in western side, known as Nandan Pahar pond.

Sources of pollution of these two water bodies are different and the levels of pollution are also different. The aims of my studies are to analyze the physico-chemical properties of these two water bodies and to identify different classes of algae, their seasonal morphological variation and distribution. Finally I have to co-relate the physico-chemical properties of water of these ponds with their corresponding algal flora. In view of the above pond, the present study has

been undertaken to assess the quality of water of these two ponds and recommended measures to be taken in order to keep these two ponds pollution free.

Problems to be investigated

Water is basis of life on the earth. In recent past due to human activities and human related other activities there is phenomenal increase in pollution level in general and water bodies in particular. These water bodies particularly ponds are created to fulfill the human needs.

Unfortunately due to unscrupulous and indiscriminate usage of water bodies ponds are getting polluted badly.

In the present proposed investigation the problem to be investigated are the studies of polluted ponds due to various religious activities in terms of physico-chemical properties and algal flora.

Objective of the investigation and motivation

- To identify the diversity of available flora of algae systematically.
- To analyze the physical properties of water of both the pond.
- To test and analyze the chemical properties of the water of both the pond.
- To check the quantity of total suspended solids in water.
- To test the pH of water.
- To check the turbidity of water.
- To check the biological oxygen demand of the water.
- To check chemical oxygen demand of the water.
- To provide safer limit of water pollution.
- To motivate local people for prevention of water pollution.
- To save aquatic flora and fauna by controlling different parameters of water pollution.

Hypothesis

1. The studied pond i.e. Simaria pond has mythological significance. So the study of the flora and fauna of the pond are very important.
2. The pond may harbour many algal species of economic and medicinal properties.
3. The study of physical and chemical nature of water may lead to new discovery.
4. The study of the pond ecosystem will give new aspect and dimension in water ecosystem.
5. Quality of water is directly concerned to human health and hygiene.
6. Results will provide data which can be used to eradicate the pollutants and in keeping the water clean.
7. Documentation of algal contamination will be done for the first time.

Research Design and Methodology

Observation and Identification of algal taxa

a. Collections of algal samples- Algal samples are collected from the same point on the same day. For this scalpel, forceps, plankton nets, specimen jar are used. All collected algal materials are placed in plastic containers along with some water of the habitat.

b. Observation of the algal samples- Collected algal materials are examined in the same day or in the next day under different magnification of compound microscope. For this temporary mount of algae is prepared with the help of slide and cover slip. Safaranine, methylene blue, iodine in potassium iodide, fast green, glycerin etc. are used for making slides.

c. Diagram making- With the help of Camera Lucida diagrams are drawn of each taxon of algae magnified under different objective lens.

d. Identification and Nomenclature - With the help of relevant literatrure . the collected algal taxa will be identified systematically.

e. Preservation- Collected algal material is preserved in 4% formalin.

f. Specimen Tagging- It is done for the collected algal taxa separately in separate specimen jar.

Test of Physical properties of the water samples

a. Collection- Water samples are collected from different points of each of the water body on the same day of each month in plastic containers.

b. Temperature Reading- Temperature of water samples collected from both the ponds is noted down with the help of thermometer.

c. Colour and Odour Checking- This is done by visual observation and scent of water.

d. Turbidity- With the help of Secchi disk turbidity of water is determined. Nephlometer is also used to determine the turbidity of water.

e. Total suspended solids- Total suspended solids of the water samples are calculated. Millipore equipment is used for finding out TSS.

Test of Chemical properties of the water samples

a. pH value determination- this is done with the help of pH meter and universal pH indicator paper.

b. Dissolved Oxygen- Dissolved oxygen of the water samples is calculated with the help of WINKLER method.

c. Bio-Chemical Oxygen demand (BOD) - It is calculated of the water samples of the ponds with the help of WINKLER method.

d. Chemical Oxygen demand (COD) – It is also calculated of the water samples of the pond. COD is calculated by using different chemical reagents.

e. Oil and Grease- This is also tested in the collected water samples with the help of different organic reagents.

Tools to be used in the collection of data

Following tools were used for collection of samples from the working sites:

(a) Equipments:

1. A Secchi disc
2. Thermometer of 1º C division
3. Colorimeter indicator
4. Compound Microscope
5. Simple Microscope
6. Camera Lucida
7. pH meter

(b) Glassware:

8. Test tube
9. Slide
10. Watch Glass
11. Specimen Jar
12. Cover slip
13. Measuring Cylinder
14. Graduated pipette
15. Beaker

(c) Miscellaneous:

16. Needle
17. Plankton net
18. Brush
19. Toothpick
20. Small vials
21. Shallow water sampler

22. Glycerin
23. Formaldehyde
24. Safaranine stain
25. Methylene blue

Significance of the study

Simaria pond is highly polluted pond. So its awareness among people is necessary in order to control water pollution of Simaria pond, to save the life of the local people from epidemic and contagious diseases and to know the algal flora of the pond. Documentation of algal flora of the studied pond will be done.

Its relevance to the present day problem and need of the society

Ultimately the toxic chemical and domestic effluent due to different human activities like bathing, washing, fishing and immersion of idols and images of gods and goddesses are polluting the Simaria pond. Water becomes highly polluted, so its preventive measures should be taken on time so that lives of human being and pilgrims can be saved. If it is not cared then there is a probability of great loss of biodiversity of flora and fauna of the pond. So it is of great need for the society.

Contribution to the existing knowledge

Water is life. For the best uses of water it is very important to assess its quality. To know the extent of water pollution level both physico-chemical analysis of water and the presence growth and periodicity of algal bio-indicator can be used. Such a study will help to decide upon the physical, chemical and biological treatment to be given to each water body. By the comparative study of the Simaria pond and Nandan Pahar pond, we enrich our knowledge by knowing the different parameters controlling the quality of water i.e. pH value of water, viscosity of water, temperature of water, colour of water, dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand, total suspended solids, oil and grease, turbidity and knowledge regarding diversity of algal flora.

Future work

My work will be basis of comparative study of the pond for religious activity and unpolluted controlled pond.

This will encourage other researchers to take a similar type of research activity in different ponds found in Deoghar or other part of Jharkhand state.

This will help in treatment of water pollution. This will be used to for biological control of water pollution.

This will be useful for chemical treatment of polluted water of the pond.

May be useful for the intensive and extensive study of algal diversity of other ponds.

May be useful for comparative co-relation work of polluted and unpolluted ponds with reference to diversity of flora and fauna along with aquatic habitat.

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